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Asymptotic expansion of the coverage probability of James-stein estimators

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Abstract

This paper provides a new approach to the asymptotic expansion construction of the coverage probability of the confidence sets recentered in [W. James and C. Stein, Estimation with quadratic loss, in Proceedings of the Fourth Berkeley Symposium on Mathematical Statistics and Probability, Vol. 1, Univ. California Press, Berkeley, CA, 1961, pp. 361-379] and its positive-part Stein estimators [C. Stein, J. Roy. Statist. Soc. Ser. B, 24 (1962), pp. 265-296]. The coverage probability of these confidence sets depends on the noncentrality parameter r2 as in the case of risks of these estimators. The new approach (which is different than Berger's [J. O. Berger, Ann. Statist, 8 (1980), pp. 716-761] and Hwang and Casella's [J. T. Hwang and G. Casella, Statist. Decisions, suppl. 1 (1984), pp. 3-16]) allows us to obtain the asymptotics analysis of the coverage probabilities for the two cases, namely, when r 2 → 0 and r2 → ∞. For both cases we provide a simple approximation of the coverage probabilities. Some graphical and tabular results are provided to assess the accuracy of our approximations. © 2007 Society for Industrial and Applied Mathematics Translated from Russian Journal.

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Keywords

Asymptotic expansion, Confidence sets, Coverage probability, James-Stein estimators, Multivariate normal distribution, Stein estimation